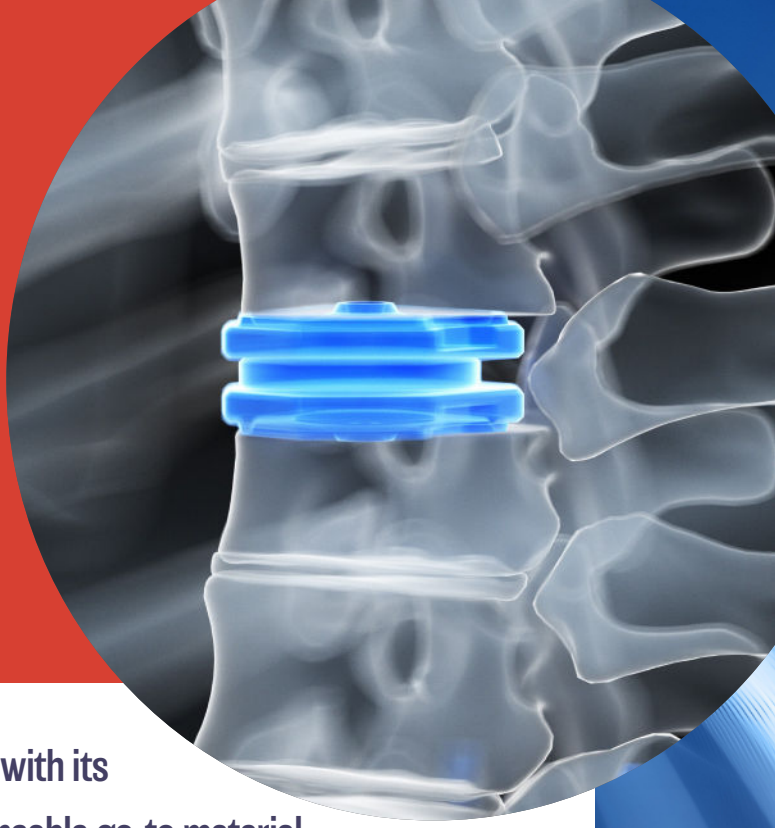
APPLICATION SPOTLIGHT

SILICONE



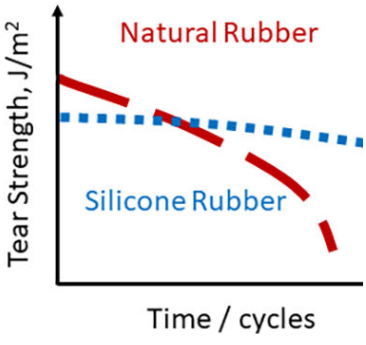
Silicone's versatility, durability and flexibility combined with its thermal and environmental stability make it an indispensable go-to material for virtually every industry. Endurica provides testing and simulation workflows for fatigue analysis of silicones. Let Endurica help you determine how long your product will last before you make your first prototype.

CAPABILITIES

- Evaluate the durability of your silicone compound formulations before moving into prototype production.
- Understand the impact of tension, shear, bending, and compression on your silicone part during design work.
- Evaluate your silicone compound durability under various loads and temperatures early in development.
- See your design's performance in its aged condition, now.
- Use Endurica's workflows to optimize product geometries for durability early in the design process.
- Simulation and durability assessments can save time and money when developing products requiring client and government approvals.

SIMULATION ADVANTAGES IN SILICONE PRODUCT DESIGN

Working with your CAE simulation during design, Endurica's workflows tell you how long your silicone product will last by computing how many use cycles your design will endure before failure.



Natural rubber has great durability initially (red line). But silicone is often a better choice for applications involving high temperatures or longer lifetimes (blue line).

Endurica's software and materials property testing services can help you optimize both your design and silicone compound for durabiliity.

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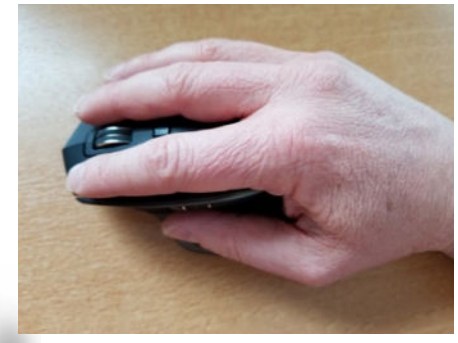
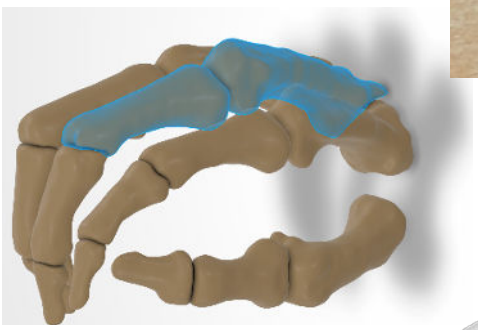
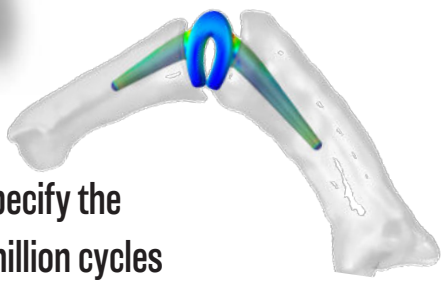
WINNING ON DURABILITY

GIVING ARTHRITIS THE FINGER

Rheumatoid arthritis may lead to the need for total joint replacement, in which a silicone elastomer prosthetic is implanted.



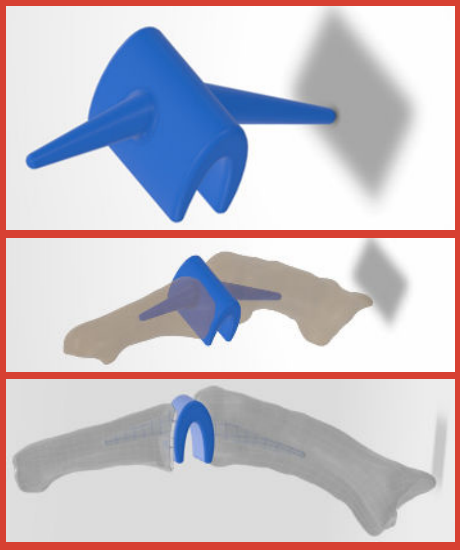




Design qualification requirements specify the prosthetic must endure at least 10 million cycles in which the finger joint is flexed through 90 degrees.

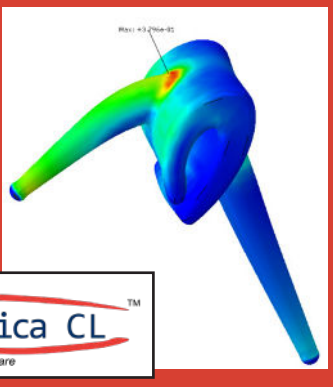
SOLUTION APPROACH

To optimize the prosthetic and ensure compliance to the durability specification, a non-linear finite element model was created in Abaqus. Two silicone compounds were characterized for evaluation. Endurica CL® simulated the number of duty cycle repeats required to grow a crack precursor from its naturally occurring initial size to its end-of-life size. This workflow enables designers to select the right material and get durability right before qualification testng.



	Silicone A	Silicone B
C_0	0.0273	0.0134
C_F	1 (mm)	1 (mm)
R_C	5.46e-4 (mm/Cycle)	5.46e-4 (mm/Cycle)
T_C	15 (kJ/m^2)	15 (kJ/m^2)
F_0	1.29	2.54

The red area in the simulation at right indicates the failure location.



Endurica CL™
Fatigue Analysis Software

This presentation was made at CAASE18, The Conference on Advancing Analysis & Simulation in Engineering.
Resource Abstract: https://www.nafems.org/publications/resource_center/caase_jun_18_32/

Technetics

In optimizing a geometry to extend the fatigue life of a product, I ran a few iterations of inner-cavity geometries and found one specific geometry with Endurica that achieved 500,000 cycles to failure in contrast to the 30,000 I had before. It's more than a 10-time improvement and that's really significant. These concrete numbers are really powerful in helping us and our customers to make good decisions.

– François Rouillard
R&D Mechanical Engineer
Maestral Sealing Laboratory
Technetics

Endurica
Get Durability Right®

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